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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/541,470	01/05/2006	Yoshinori Okazaki	501/43514/Case 101-PCT-US	8942

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EXAMINER	
KENNEDY, TIMOTHY J	

ART UNIT	PAPER NUMBER
4151	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/541,470	OKAZAKI, YOSHINORI	
	Examiner	Art Unit	
	TIMOTHY KENNEDY	4151	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 January 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 July 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *07/01/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1 and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by Bulgrin et al (U.S. PreGrant Publication 2003/0062643: Filing Date 09/29/2001).

Regarding claim 1, Bulgrin et al teach:

3. Detecting an angular velocity ω of a motor operative to propel forward a screw in an injection molding machine (wherein first input value is obtained from one of a velocity sensor and a position sensor associated with said injection molding machine: page 12, claim 16)

4. Please note that the term velocity is equal to angular velocity (paragraph 0060)

5. Deriving an estimated melt pressure value $\delta^{\wedge}$ (current melt pressure value: page 12, claim 4), based on an observer (page 12, claim 4), from said detected angular velocity ω of said motor and a torque command value T^{CMD} given to said motor (first input value is indicative of one of a velocity and a position associated with said electric motor, and wherein said second input value is indicative of one of a current and a torque associated with said electric motor: page 12, claim 4)

6. And controlling said motor such that said estimated melt pressure value $\delta^{\wedge}$ follows a melt pressure setting δ^{REF}. (pressure profiling: page 11, middle of paragraph 0081)

7. Regarding claim 9:

8. An apparatus for controlling pressure in an electric injection molding machine, comprising: an observer arithmetic unit operative to derive an estimated melt pressure value $\delta^{\wedge}$ (current melt pressure value: page 12, claim 4), based on an observer (page 12, claim 4), from an angular velocity ω of a motor operative to propel forward a screw in an injection molding machine and a torque command value T^{CMD} given to said motor (first input value is indicative of one of a velocity and a position associated with said electric motor, and wherein said second input value is indicative of one of a current and a torque associated with said electric motor: page 12, claim 4)

9. And a torque arithmetic unit operative to calculate said torque command value T^{CMD} for said motor using said estimated melt pressure value $\delta^{\wedge}$ derived at said observer arithmetic unit and feed back said torque command value to said motor. (paragraph 0021)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 2-8 and 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bulgrin et al (U.S. PreGrant Publication 2003/0062643: Filing Date 09/29/2001).

11. Regarding claim 2:

12. Wherein said observer is represented by the following Expression 1 (Expression 1 not shown)

13. $\omega\hat{}$: Estimated value of Angular velocity of Motor

14. Bulgrin et al disclose a means for detecting angular velocity (Figure 8a)

15. d_1, d_2 : Certain coefficients (Figure 8a)

16. J: Inertia moment over Injection mechanism (paragraph 0060)

17. $F(\omega)$: Dynamic frictional resistance and Static frictional resistance over injection mechanism

18. Dynamic frictional resistance and Static frictional resistance are defined as a function of torque and velocity, both of which Bulgrin et al disclose (page 12, claim 4)

19. Bulgrin et al disclose the claimed invention except for Expression 1 (symbolic of a value of a result effective variable). It would have been obvious to one having ordinary skill in the art at the time the invention was made to develop Expression 1 using the known variables, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. One would have been motivated to develop Expression 1 using the known variables, which are well within the level of ordinary skill in the art, for the purpose of controlling the injection pressure to ensure that the injection process is free of defects. *In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).*

20. Regarding claim 3:

21. Wherein said observer is represented by the following Expression 2 (Expression 2 not shown)

22. $\omega^{\wedge}$: Estimated value of Angular velocity of Motor

23. Bulgrin et al disclose a means for detecting angular velocity (Figure 8a)

24. d_1, d_2 : Certain coefficients (Figure 8a)

25. J: Inertia moment over Injection mechanism (paragraph 0060)

26. $F(\omega)$: Dynamic frictional resistance and Static frictional resistance over injection mechanism

27. Dynamic frictional resistance and Static frictional resistance are defined as a function of torque and velocity, both of which Bulgrin et al disclose (page 12, claim 4)

28. x_{-1} : Value of x at Immediately preceding processing period

29. These values would be known since these are well within the level of ordinary skill in the art and there are means for the detection of these values as described above.

30. Bulgrin et al disclose the claimed invention except for Expression 2. It would have been obvious to one having ordinary skill in the art at the time the invention was made to develop Expression 2 using the known variables, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. One would have been motivated to develop Expression 2 using the known variables for the purpose of controlling the injection pressure to ensure that the injection process is free of defects. *In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).*

31. Regarding claim 4:

32. Wherein said screw in said injection molding machine and said motor are coupled together via a belt suspended around pulleys mounted on respective rotation shafts (Figure 2 and 5), and wherein said observer is represented by the following Expression 3 (Expression 3 not shown)

33. d_1 - d_5 : Certain coefficients (Figure 8a)

34. J^M : Inertia moment at Motor side (paragraph 0060)

35. ω^M :angular velocity of Motor (paragraph 0060)

36. R^M :Pulley radius at Motor side (This would be a known variable of the injection molding machine: Figure 6)

37. F : Tension of Belt (This would be a known variable of the injection molding machine: Figure 6)

38. K_b : Spring constant of Belt (This would be a known variable of the injection molding machine: Figure 6)

39. J^L : Inertia moment at Screw side (paragraph 0060)

40. ω^L : Angular velocity at Screw side (paragraph 0060)

41. R^L : Pulley radius at Screw side (This would be a known variable of the injection molding machine: Figure 5)

42. $Fd(\omega^L)$: Dynamic frictional resistance at Screw side

43. Dynamic frictional resistance is defined as a function of torque and velocity, both of which Bulgrin et al disclose (paragraph 0060)

44. K_w : Elastic modulus of Resin (This is a known variable of the material being injected)

45. K_{wd} : Coefficient of Viscosity of Resin (This is a known variable of the material being injected)

46. σ : Force of Screw pushing Resin (paragraph 0061)

47. Bulgrin et al disclose the claimed invention except for Expression 3. It would have been obvious to one having ordinary skill in the art at the time the invention was made to develop Expression 3 using the known variables, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. One would have been motivated to develop Expression 3 using the known variables for the purpose of controlling the injection pressure to ensure that the injection process is free of defects. *In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).*

48. Regarding claim 5:

49. Wherein said screw in said injection molding machine and said motor are coupled together via a belt suspended around pulleys mounted on respective rotation shafts (Figure 2 and 5), and wherein said observer is represented by the following Expression 4 (Expression 4 not shown)

50. d_1 - d_5 : Certain coefficients (Figure 8a)

51. J^M : Inertia moment at Motor side (paragraph 0060)

52. ω^M :angular velocity of Motor (paragraph 0060)

53. R^M :Pulley radius at Motor side (This would be a known variable of the injection molding machine: Figure 6)

54. F : Tension of Belt (This would be a known variable of the injection molding machine: Figure 6)

55. K_b : Spring constant of Belt (This would be a known variable of the injection molding machine: Figure 6)

56. J^L : Inertia moment at Screw side (paragraph 0060)

57. ω^L : Angular velocity at Screw side (paragraph 0060)

58. R^L : Pulley radius at Screw side (This would be a known variable of the injection molding machine: Figure 5)

59. $Fd(\omega^L)$: Dynamic frictional resistance at Screw side

60. Dynamic frictional resistance is defined as a function of torque and velocity, both of which Bulgrin et al disclose (paragraph 0060)

61. x_{-1} : Value of x at Immediately preceding processing period

62. These values would be known since there are means for the detection of these values as described above.

63. Bulgrin et al disclose the claimed invention except for Expression 4. It would have been obvious to one having ordinary skill in the art at the time the invention was made to develop Expression 4 using the known variables, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. One would have been motivated to develop Expression 4 using the known variables for the purpose of controlling the injection pressure to ensure that the injection process is free of defects. *In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).*

64. Regarding claim 6:

65. Wherein said screw in said injection molding machine and said motor are coupled together via a belt suspended around pulleys mounted on respective rotation shafts (Figure 2 and 5), and wherein said observer is represented by the following Expression 5 (Expression 5 not shown)

66. $d_1 - d_4$: Certain coefficients (Figure 8a)

67. J^M : Inertia moment at Motor side (paragraph 0060)

68. ω^M :angular velocity of Motor (paragraph 0060)

69. R^M :Pulley radius at Motor side (This would be a known variable of the injection molding machine: Figure 6)

70. F : Tension of Belt (This would be a known variable of the injection molding machine: Figure 6)

71. K_b : Spring constant of Belt (This would be a known variable of the injection molding machine: Figure 6)

72. J^L : Inertia moment at Screw side (paragraph 0060)

73. ω^L : Angular velocity at Screw side (paragraph 0060)

74. R^L : Pulley radius at Screw side (This would be a known variable of the injection molding machine: Figure 5)

75. $Fd(\omega^L)$: Dynamic frictional resistance at Screw side

76. Dynamic frictional resistance is defined as a function of torque and velocity, both of which Bulgrin et al disclose (paragraph 0060)

77. Bulgrin et al disclose the claimed invention except for Expression 5. It would have been obvious to one having ordinary skill in the art at the time the invention was

made to develop Expression 5 using the known variables, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. One would have been motivated to develop Expression 5 using the known variables for the purpose of controlling the injection pressure to ensure that the injection process is free of defects. *In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).*

78. Regarding claim 7:

79. Wherein said screw in said injection molding machine and said motor are coupled together via a belt suspended around pulleys mounted on respective rotation shafts (Figure 2 and 5), and wherein said observer is represented by the following Expression 6 (Expression 6 not shown)

80. $d_1 - d_4$: Certain coefficients (Figure 8a)

81. J^M : Inertia moment at Motor side (paragraph 0060)

82. ω^M :angular velocity of Motor (paragraph 0060)

83. R^M :Pulley radius at Motor side (This would be a known variable of the injection molding machine: Figure 6)

84. F : Tension of Belt (This would be a known variable of the injection molding machine: Figure 6)

85. K_b : Spring constant of Belt (This would be a known variable of the injection molding machine: Figure 6)

86. J^L : Inertia moment at Screw side (paragraph 0060)

87. ω^L : Angular velocity at Screw side (paragraph 0060)

88. R^L : Pulley radius at Screw side (This would be a known variable of the injection molding machine: Figure 5)

89. $Fd(\omega^L)$: Dynamic frictional resistance at Screw side

90. Dynamic frictional resistance is defined as a function of torque and velocity, both of which Bulgrin et al disclose (paragraph 0060)

91. x_{-1} : Value of x at Immediately preceding processing period

92. These values would be known since there are means for the detection of these values as described above.

93. Bulgrin et al disclose the claimed invention except for Expression 6. It would have been obvious to one having ordinary skill in the art at the time the invention was made to develop Expression 6 using the known variables, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. One would have been motivated to develop Expression 6 using the known variables for the purpose of controlling the injection pressure to ensure that the injection process is free of defects. *In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).*

94. Regarding claim 8:

95. The method of controlling pressure in an electric injection molding machine according to claim 3, 5, or 7, further comprising: calculating said torque command value T^{CMD} for said motor based the following Expression 7 (Expression 7 not shown); and feeding back said torque command value to said motor. (paragraph 0021)

96. kp: Certain constant

97. α : Certain function or constant

98. Development of constants is well within the abilities of a skilled artisan.

99. Bulgrin et al disclose the claimed invention except for Expression 7. It would have been obvious to one having ordinary skill in the art at the time the invention was made to develop Expression 7 using the known variables, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. One would have been motivated to develop Expression 7 using the known variables for the purpose of controlling the injection pressure to ensure that the injection process is free of defects. *In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).*

100. Regarding claim 10:

101. The method of controlling pressure in an electric injection molding machine according to claim 1, further comprising deriving a dynamic frictional resistance $F(\omega)$ from a relation between a velocity or position and a torque or current value associated with said motor at the time of injection with no resin loaded.

102. Dynamic frictional resistance is defined as a function of torque and velocity, both of which Bulgrin et al disclose (paragraph 0060)

103. Bulgrin et al disclose the claimed invention except for a dynamic frictional resistance $F(\omega)$ function. It would have been obvious to one having ordinary skill in the art at the time the invention was made to develop a $F(\omega)$ function using the known variables, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. One would have been motivated to develop a $F(\omega)$ function using the known variables for the purpose of controlling the

injection pressure to ensure that the injection process is free of defects. *In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).*

104. Regarding claim 11:

105. The method of controlling pressure in an electric injection molding machine according to claim 1, further comprising: defining a dynamic frictional resistance $F(\omega)$ as a sum of a velocity-dependent component and a load-dependent component; deriving said velocity-dependent component of said dynamic frictional resistance from a relation between a velocity or position and a torque or current value associated with said motor at the time of injection with no resin loaded; and deriving said load-dependent component of said dynamic frictional resistance from a relation between a torque or current value and a pressure value at the time of injection with a plugged nozzle

106. Dynamic frictional resistance is defined as a function of torque and velocity, both of which Bulgrin et al disclose (paragraph 0060)

107. Bulgrin et al disclose the claimed invention except for a dynamic frictional resistance $F(\omega)$ function. It would have been obvious to one having ordinary skill in the art at the time the invention was made to develop a $F(\omega)$ function using the known variables, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. One would have been motivated to develop a $F(\omega)$ function using the known variables for the purpose of controlling the injection pressure to ensure that the injection process is free of defects. *In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).*

Conclusion

108. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

109. U.S. Patent 4,759,705: Torque and pressure

110. U.S. Patent 4,887,012: Torque and pressure

111. U.S. Patent 5,102,587: Pressure detection and velocity

112. U.S. Patent 5,362,222: Torque and pressure

113. U.S. Patent 5,911,924: Velocity, positioning, and pressure

114. U.S. Patent 6,562,264: Pressure and controls

115. Japan Patent 09220748 A: Torque, velocity, and inertia

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TIMOTHY KENNEDY whose telephone number is (571)270-7068. The examiner can normally be reached on Monday to Thursday 7:30am to 5:00pm, and every other Friday 7:30am to 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Angela Ortiz can be reached on (571) 272-1206. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

tjk

/Angela Ortiz/

Supervisory Patent Examiner, Art Unit 4151